emergency

MEDUMAT Easy

Ventilator

WM 28000

Servicing and repair instructions

WEINMANN
medical technology

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Introduction

For decades WEINMANN has been developing, manufacturing and marketing devices for emergency medical care, oxygen therapy and inhalation therapy.

In 1972 WEINMANN put the first MEDUMAT emergency respirator on the market.

MEDUMAT emergency respirators are automatic respirators. They are used for controlled respiration in emergency medical care, e.g. in cases of acute respiratory disorders, and also secondary obstructions.

The new generation of devices, developed specifically to meet users' requirements and put on the market in 1997, offers users and patients increased security. An intelligent alarm system monitors the patient's breathing and informs the user about any problems that occur. These devices thus offer even greater security and reliability during respiration.

The aim of these servicing and repair instructions is to familiarise you, **as an expert in the field**, with the function, technology, servicing and repair of the MEDUMAT respirator. Thanks to training which you have already received from WEINMANN, you now count as "trained expert personnel" and can therefore give your customers appropriate instructions, remedy problems on your own and perform the functional checks prescribed in the operating instructions and any repairs required in accordance with these Service and Repair Instructions.

In the event of a warranty claim, send the MEDUMAT to WEINMANN.

To enable us to process ex gratia requests or warranty claims, please enclose the customer's proof of purchase (invoice) with the device.

Repairs or servicing work may be performed only by WEINMANN or by trained specialist staff.

You are responsible for repairs carried out yourself and for their warranty!

Use **only original WEINMANN spares** for repairs.

Please bear in mind:
Your customer trusts you and relies on your expert capability, just as you rely on WEINMANN.

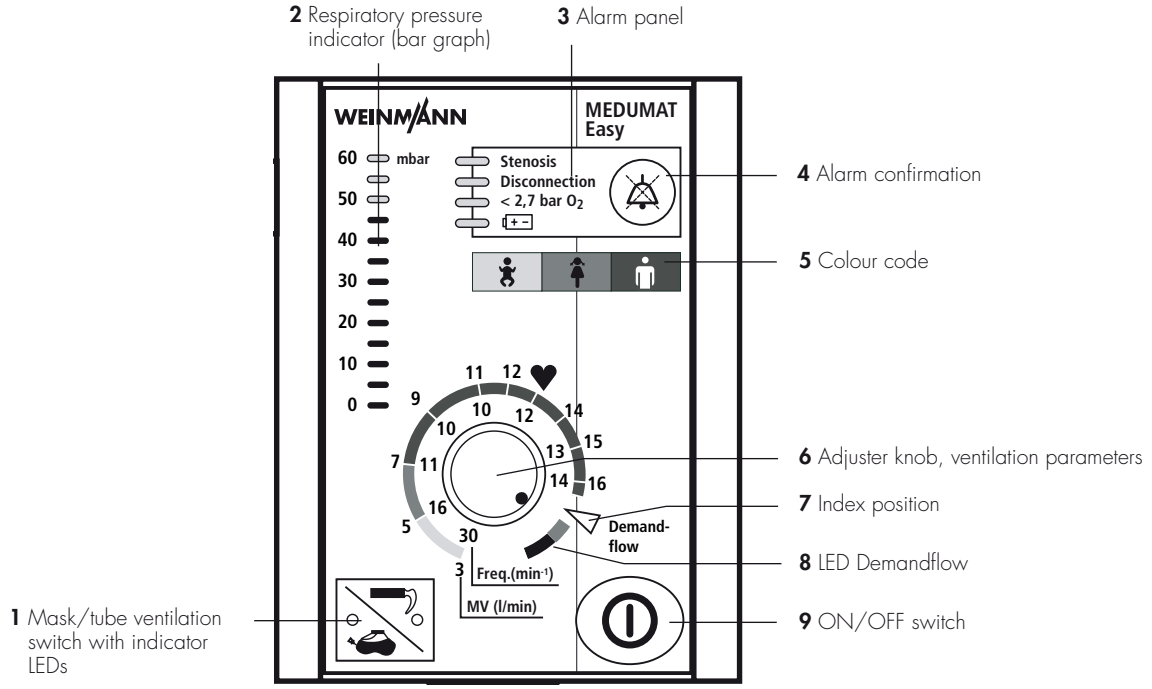
Note:

For the following information, please consult the Operating Instructions for MEDUMAT:

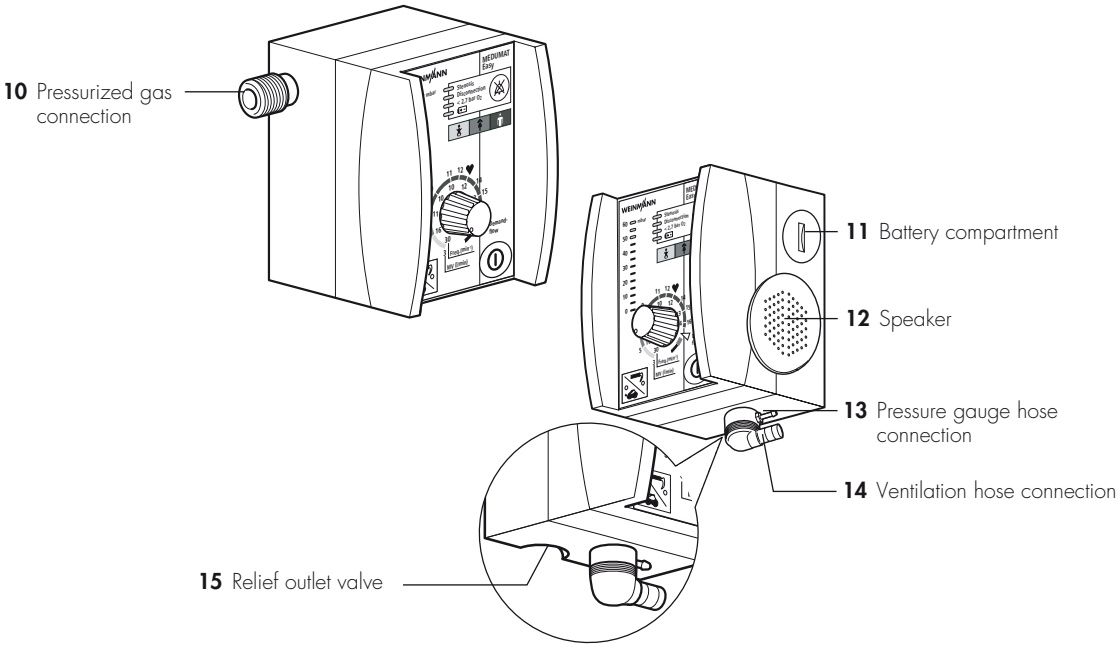
- Safety Information
- Fitting accessories
- Operating MEDUMAT emergency respirators
- Hygienic preparation
- Functional check

1. Overview

Control panel MEDUMAT Easy

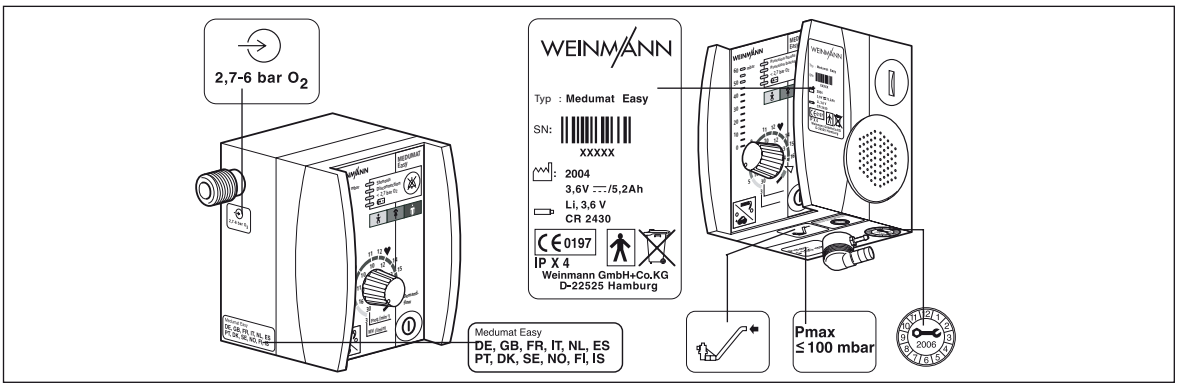


Connections MEDUMAT Easy



1.1 Special symbols on the ventilator

Symbols on MEDUMAT Easy



2,7-6 bar O_2	Inlet 2,7 - 6 bar O_2.
MEDUMAT Easy device information plate	
SN	Serial number of device
	Year of manufacture
	Do not dispose of device in domestic waste.
Safety check and servicing label	
	Servicing label: indicates when the next service is due.
	Safety check label: (in Germany only) marks when the next safety check as per §6 of the German law relating to users of medical devices is required.

2. Description

2.1 Uses

MEDUMAT Easy is an automatic oxygen respiration device (short-term ventilator) with additional inhalation facility.

You can use MEDUMAT Easy:

- to revive patients at the site of the emergency;
- for longer periods in more protracted emergencies, e.g. fires;
- for short-term O_2 inhalation using a respiration mask.

You can use MEDUMAT Easy while transporting patients:

- between the various rooms and departments of a hospital;
- between the hospital and other premises;
- in emergencies;
- when transport over considerable distances is planned.

MEDUMAT Easy:

- is designed to provide controlled ventilation to persons of 10 kg body weight or more;
- is used to treat respiratory arrest;
- can be preset to parameters that ensure evenly balanced ventilation, provided that the selected maximum ventilation pressure P_{max} is not exceeded;
- permits breathing-controlled oxygen inhalation in Demand mode.

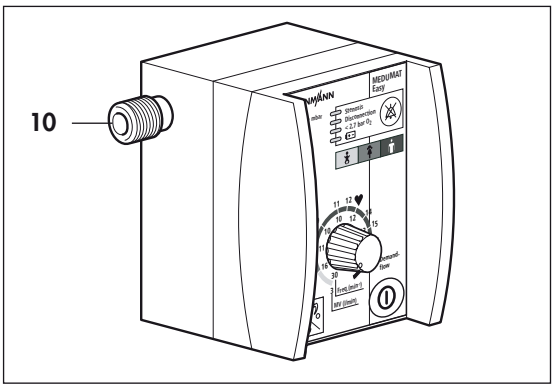
2.2 Ventilation function

MEDUMAT Easy operates within a pressure range of 2.7 to 6 bar and at a flow rate of not less than 70 l/min O_2. It has a built-in power supply.

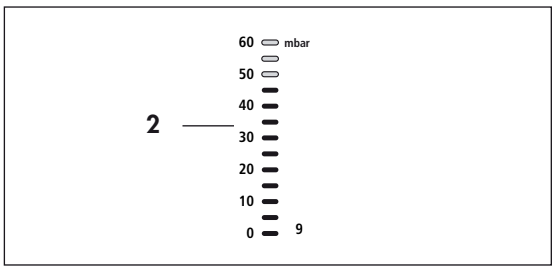
It uses high-pressure, medicinal-grade oxygen. An external pressure reducer brings this down to the required operating pressure. The oxygen supply is fed in at input valve **10**.

The ventilation settings are continuously variable. These settings (frequency and volume per minute are coupled) and the inspiration/expiration ratio of 1:1.67 are regulated by internal electronic control mechanisms.

The gas for inspiration flows along the hose and through the patient valve and either the mask or tube into the patient's airways. The patient valve is fitted with a lip membrane that enables expired gas to be conducted away through the expiration tube.

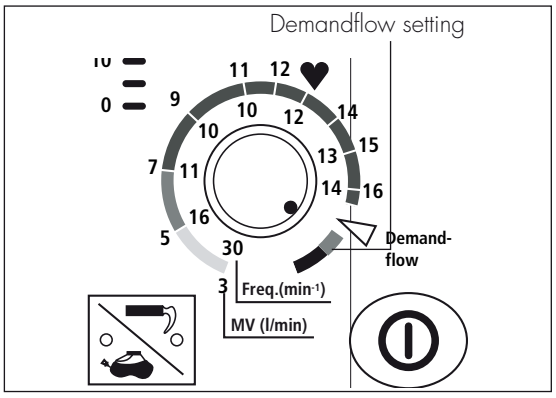


You can check the course of ventilation on the respiration pressure indicator **2**.



2.3 Demandflow function

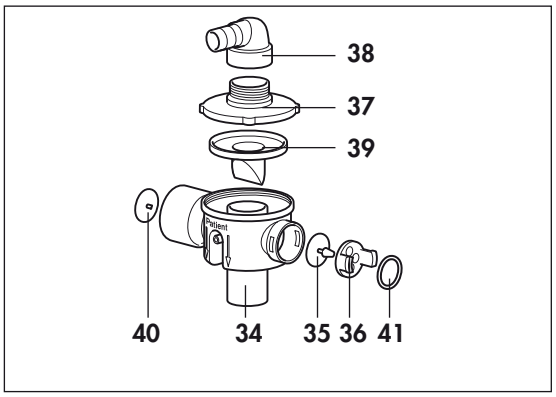
The Demandflow setting switches the MEDUMAT Easy to breathing-controlled O_2 inhalation. Such inhalation must be carried out with the respiration mask. A small inspiration (trigger) pulse causes oxygen to continue flowing until slight overpressure interrupts the flow. Expiration then takes place via the patient valve as in ventilation.



2.4 Patient valve

The gas for inspiration is channelled into the patient's airways through the patient valve.

The valve is designed to enable spontaneous breathing in the event of failure of the MEDUMAT Easy.



2.5 Audio response

The device has an audio response facility that can be switched on for user guidance, especially for users who have little practice.

If audio guidance is not wanted, it can be switched off by pressing a combination of keys (see "4.10 Audio response for user guidance" in the operating instructions).

3. Final check

After every repair and every service, the device must be subjected to the following final check in accordance with Test Instructions WM 28001 and the test record.

Note:
For the final check on the MEDUMAT Easy you must connect the ventilation hose and the patient valve to the device.

MEDUMAT Easy must not be used if the final check reveals defects or deviations from the specified parameters.

We recommend that you always hold reserve stocks of the following items:

- replacement washers for the connections;
- lip membrane for the patient valve.
- membrane for spontaneous breathing tube;
- membrane for exhalation tube;
- O-ring 1145/118.

3.1 Testing equipment required

- Volume flow meter, Type RT 200 (Timeter), Type EKU VIP – ventilator, PF 300 Imtmedical or comparable test device
- Adjustable orifice, e.g. ball valve, internal diameter ≥ 10 mm
- Test set for functional checks WM 15323
- Oxygen concentration meter, 0 – 100% ± 1%, e.g. Type Oxycontrol WM 13550
- Set, hose with syringe WM 15359
- Pressure gauge 0 - 6.3 bar, class 1.6
- Pressure gauge 0 -100 mbar, class 1.6
- Set, supply test Medumat / Modules WM 15440

3.2 Preparing for final check

1. Connect MEDUMAT Easy to the 4.5 - 6 bar pressure supply.
2. Connect ventilation hose and pressure measurement tube to MEDUMAT Easy.
3. Device setting: Freq. = 30 min^{-1}, MV = 3 l/min.
4. Language setting “English”.

3.3 Entering the device data

- Enter the device number and the tester number in the test record.

3.4 Testing for leaks and pressure reading

3.4.1 Checking input side for leaks

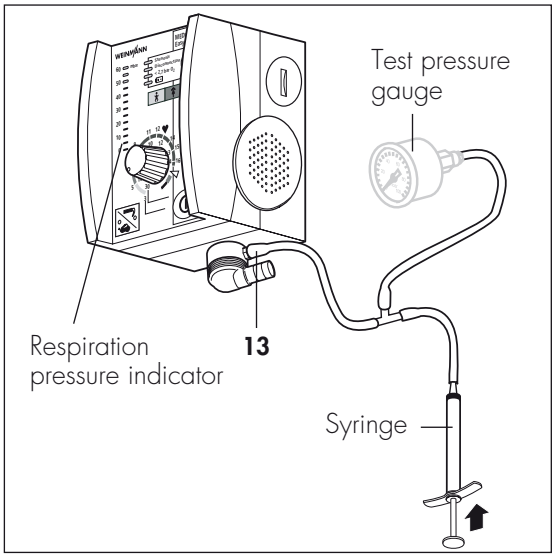
- With the device switched off, apply 6 bar pressure to input side and and shut off output pressure.

  Requirement: The pressure drop must be less than 0.2 bar/min.

3.4.2 Checking pressure measurement zone for leaks

- Apply 55 mbar ± 2 mbar to MEDUMAT pressure measurement zone.

  Requirement: The pressure drop must be ≤ 2 mbar/min.



3.5 Self-test when device is switched on

If audio response is enabled, you will hear the sentence "Open oxygen cylinder" before the self-test starts.

1. Apply 4.5 bar to the input.
2. Switch on MEDUMAT Easy at button **9**.

   Requirement: The self-test starts, the ventilation mode LEDs light up once each one after the other, the alarm LEDs flash, the pressure indicator LEDs are run through 3 times, a signal tone sounds and an audio response sentence is spoken.

3.6 Functional check on controls (button check)

1. Open the pressure supply.
2. Switch on the device.
3. Switch from mask ventilation to tube ventilation.
4. Press the alarm acknowledgement button.

3.7 Functional test and alarms

3.7.1 Test Stenosis alarm

- Switch to tube ventilation ( ) and close patient valve outlet.
- Operate device at Freq. setting = 30 min^{-1} and MV = 3 l/min.

  Requirement: The Stenosis alarm must be triggered after two ventilation cycles. If audio response is enabled, the ventilator announces "Check airways and minute volume".

3.7.2 Checking alarm confirmation

- Immediately after the first alarm tone sounds, press Alarm confirmation button **4**.

  Requirement: The alarm tone must be suppressed immediately.

3.7.3 Test Disconnection alarm

- Open patient valve outlet.

  Requirement: The Disconnection alarm must be triggered after two ventilation cycles. If audio response is enabled, the ventilator announces "Check ventilation system and settings".

3.7.4 Test Pressure alarm

- Shut off pressurised gas connection of MEDUMAT (2.7 - 6.0 bar).

  Requirement: The Pressure alarm must be triggered. If audio response is enabled, the ventilator announces "Check pressure hose system and gas supply".

3.7.5 Checking Demand mode LED

- Open the pressure supply.

  Requirement: Demand mode LED must come on (flickering).

3.7.6 Check voice output

3.8 Battery power

3.8.1 3.0 V battery (on board)

Since the 3.0 V lithium cell is difficult to access, its charge status can be checked both via the interface and in a relevant menu.

To do so, hold down the alarm confirmation button while switching the device on. The device is then in battery check mode for 3 seconds, before switching to normal operating mode.

During this 3-second period the "Power supply" alarm in the alarm panel lights up and the voltage measured for the lithium cell is shown on the pressure bar graph.

The adjacent table shows how the voltage readings correspond to the bar graph values.

Bar graph value (mbar)	Battery voltage (V)
60	3.21
55	3.19
50	3.17
45	3.15
40	3.13
35	3.11
30	3.09
25	3.07
20	3.05
15	3.03
10	3.01
5	2.99
0	2.97

Requirement: Voltage measured for 3.0 V battery is in the range 3.0 to 3.2 V; the alarm for this cell is triggered at 2.7 V.

3.8.2 3.6 V battery (battery compartment)

Remove the 3.6 V battery from the battery compartment and measure the voltage with a digital multimeter.

Requirement: Voltage measured for 3.6 V battery is in the range 3.4 to 3.7 V.

3.9 Test pressure sensors

3.9.1 Input pressure sensor

- Shut off pressurised gas connection of MEDUMAT (2.7 - 6.0 bar).

  Requirement: The Pressure alarm must be triggered. If audio response is enabled, the ventilator announces "Check pressure hose system and gas supply".

3.9.2 Ventilation pressure sensor

- Connect ventilation hose to test bag.
- Run device with settings: Freq. = 10 min^{-1} and MV = 11 l/min.
- Switch device to mask ventilation.

  Requirement: The pressure limit must respond at 20 ± 5 mbar.
- Switch device to tube ventilation.

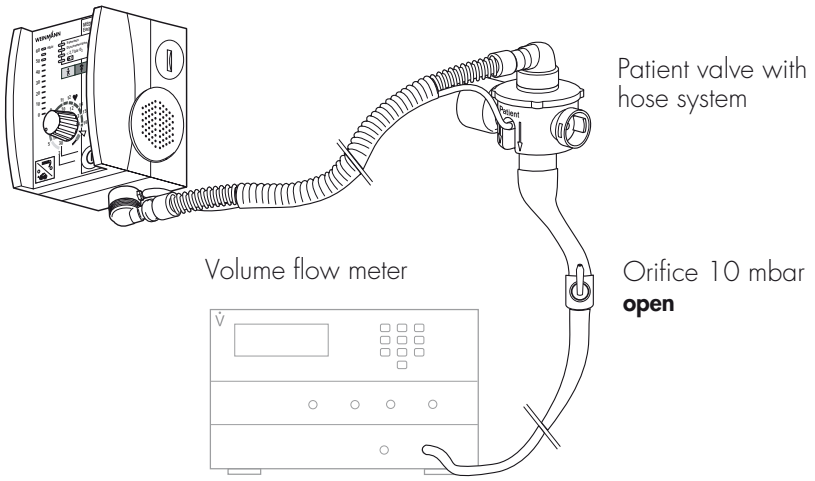
  Requirement: The pressure limit must respond at 45 ± 5 mbar.

3.9.3 Demand flow sensor

1. Supply device with pressure.
2. Switch on MEDUMAT Easy at button **9**.
3. Connect ventilation tube and patient valve to test bag.
4. Set MEDUMAT Easy to demand flow mode.
5. Green LED in demand mode button illuminates.
6. Squeeze the test bag.

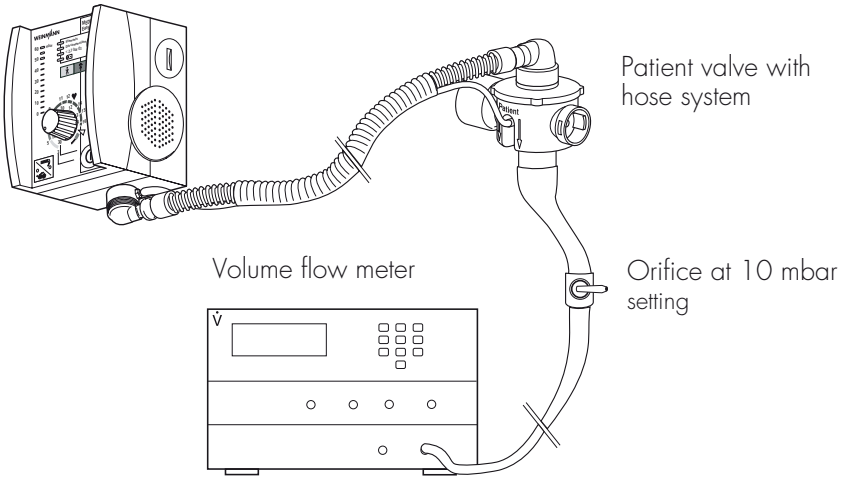
   Requirement: Releasing the test bag triggers a short ventilation.

3.10 Functional check on frequency setting



- Connect ventilation hose to 10 mbar orifice and to volume flow meter.
- Run device with settings: Freq. = 14 min^{-1} and MV = 16 l/min.
  Requirement: The frequency must be 14 ± 2 min^{-1}.
- Run device with settings: Freq. = 10 min^{-1} and MV = 11 l/min.
  Requirement: The frequency must be 10 ± 2 min^{-1}.
- Run device with settings: Freq. = 30 min^{-1} and MV = 3 l/min.
  Requirement: The frequency must be 30 ± 2 min^{-1}.

3.11 Functional check breath volume at 4.5 bar input pressure and 10 mbar back pressure

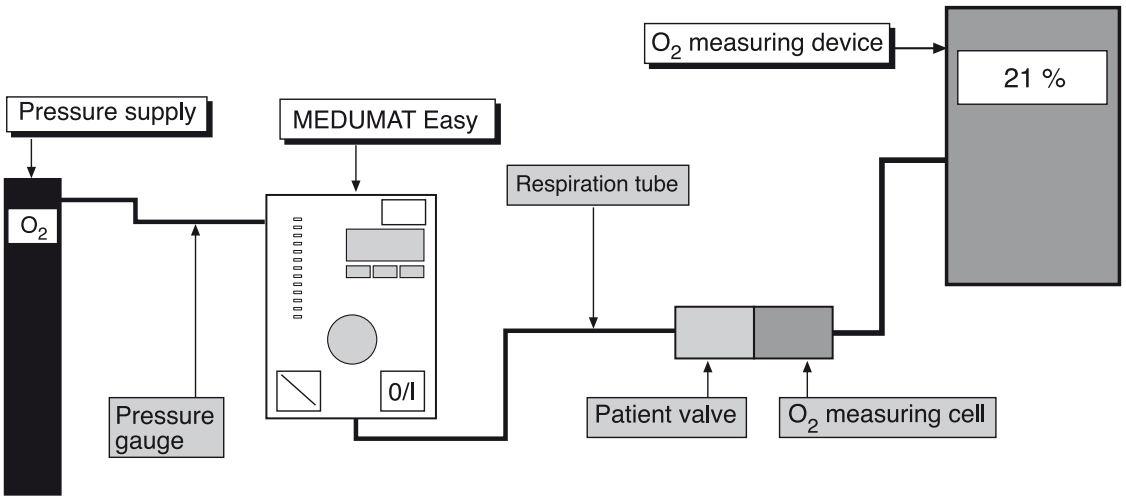


- Run device with settings: Freq. = 14 min^{-1} and MV = 16 l/min.
  Requirement: Breath volume must be 1140 ± 170 ml.
- Run device with settings: Freq. = 10 min^{-1} and MV = 11 l/min.
  Requirement: Breath volume must be 1100 ± 170 ml.
- Run device with settings: Freq. = 30 min^{-1} and MV = 3 l/min.
  Requirement: Breath volume must be 100 ± 20 ml.

3.12 Checking O_2 concentration

- Run device with settings: Freq. = 10 min^{-1}, MV = 11 l/min and 100% O_2.

  Requirement: The O_2 concentration must be > 98%.



3.13 Functional check on pressure limit

- Connect ventilation hose to test bag.
- Run device with settings: Freq. = 10 min^{-1} and MV = 11 l/min.
- Switch device to mask ventilation.

  Requirement: The pressure limit must respond at 20 ± 5 mbar.
- Switch device to tube ventilation.

  Requirement: The pressure limit must respond at 45 ± 5 mbar.

3.14 Functional check on relief valve without patient valve

- Run device with settings: Freq. = 11min^{-1} and MV = 7 l/min.
- Switch ventilation hose to test bag.

  Requirement: The test bag is fully inflated during the inspiration stroke. The ventilator is then heard to release pressure.

3.15 Checking the type plate data

- Check type plate data against drawing.

  Requirement: The type plate data must be correctly entered in accordance with the drawing.

3.16 Check on external condition

- Check external condition.

  Requirements: The outside of the device is not scratched and there are no flaws.

  The connection thread is undamaged and screws easily.

  The adjuster knob is secured by self-locking against inadvertent changes.

  Elbow outlet turns easily.

3.17 Documentation

- Document items **3.3** to **3.16**, and also test date and tester number, in the test record.

4. Servicing

Note:
Remember to perform a final check after every repair.

We recommend that maintenance work such as inspections and repairs be performed only by the manufacturer, i.e WEINMANN, or by qualified technicians expressly authorized by WEINMANN.

4.1 Intervals and scope

Every 2 years:

Every 2 years the device (incl. patient valve and hose system) must undergo **servicing** and be subjected to a **safety check** as specified below.

You can also have servicing and the safety check performed by WEINMANN.

Be sure to check the following items:

- Check equipment for completeness;
- Visual check:
  - Mechanical damage
  - Labelling of controls
  - Damage to all external hoses;
- Renew parts subject to wear / parts requiring compulsory replacement (see "7.2 Service sets" on page 37);
- Check system components: carrying platforms, oxygen fittings, secretion suction system, hose connections etc.;
- Check test bag;
- **Final check in accordance with Test Instructions/ Test Record STK WM 28001 (see "3. Final check" on page 8 and see "11. Repair and service records" on page 43).**

Every 4 years:

- Servicing of the fittings in the oxygen supply system (e.g. pressure reducer) either by the manufacturer or by a specialist expressly authorized by the manufacturer.

Every 10 years:

- Repeat testing of conventional steel or aluminium oxygen cylinders by the responsible testing organisation. The repeat testing date is stamped on the shoulder of the cylinder.

4.2 Batteries

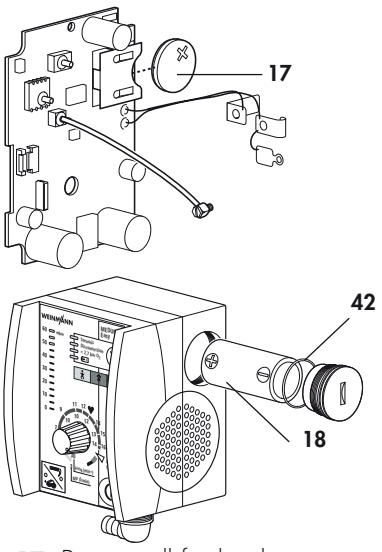
MEDUMAT Easy is equipped with two batteries. The main battery **18** must always be changed. The button cell **17** (CR2430) only has to be replaced every **4 years**.

The button cell **17** supplies auxiliary power to the electronic system if the main battery **18** fails. This makes it possible to set off an alarm even if the main battery suddenly fails. The device then switches to exhalation.

In principle, the battery capacity is designed so that under normal conditions of use, it will not need changing in the 2 years between services. The main battery **18** is to be renewed during the 2-yearly service, the button cell **17** only every 4 years.

When changing batteries, special precautions must be taken to protect the electronic circuits (see "6.5 Replacing button cell" on page 24).

When changing the main battery **18**, you must change the O-ring **42** on the battery compartment cover as well.



17: Button cell for back-up power

18: Lithium battery 3.6 V for main power supply MEDUMAT Easy

4.3 Storage

If you do not intend to use MEDUMAT Easy for a long period, we recommend the following storage precautions:

1. Clean and disinfect the device (see "5. Hygienic Preparation" in the operating instructions).
2. Store MEDUMAT Easy in a dry place.

Important
Remember that devices still require servicing at the specified intervals even when in storage, otherwise they are **not** allowed to be used when removed from storage.

5. Troubleshooting

Fault	Cause	Remedy
MEDUMAT Easy does not start up when switched on	A battery is exhausted	Change main battery **18** (4.2, page 16), check button cell **17** (3.8.1, page 10) and replace if necessary (4.2, page 16)
	Fuse defective	Change board (6.7, page 26)
	Ribbon cable **X100** of fascia film is faulty or not connected	Check plug-in connection and cable (6.7, page 26)
		If necessary, replace upper part of housing (6.11, page 31)
	On/Off button **9** defective	Change fascia film (6.12, page 32)
	Board defective	Change board (6.7, page 26)
	Magnetic valve defective	Change magnetic valve (6.9, page 29)
MEDUMAT Easy will not switch off	Operating error	Keep On/Off button **9** pressed for at least 2 seconds
	On/Off button **9** defective	Change fascia film (6.12, page 32)
MEDUMAT Easy is functioning, but without any displays	Pressure gauge hose on MEDUMAT Easy or on patient valve has slipped off	Check pressure gauge hose
	Kink in pressure gauge hose	
	Pressure gauge hose within device is kinked or has slipped off	
MV too high	Measured without 10 mbar back pressure	Set to 10 mbar back pressure
MV not correct	Measuring device not calibrated	Calibrate measuring device
	Input pressure > 6 bar	Reduce system setting to less than 6 bar
	Patient valve not in order	Check membranes and O-ring, replace if necessary (Chapter 6.7 of operating instructions)
	Potentiometer wrongly adjusted	Readjust potentiometer (6.10, page 30)
	Adjuster knob out of adjustment	Readjust adjuster knob (6.10, page 30)
	Pneumatic block leaking	Replace pneumatic block (6.8, page 27)

Fault	Cause	Remedy
Pressure limit (P_{max}) not in order	Incorrect setting selected on device	Make correct setting (Chapter 6.5 of operating instructions)
	Patient valve not in order	Check membranes and O-ring, replace if necessary (Chapter 6.7 of operating instructions)
	Patient valve or test bag not correctly connected	Check hose connections and test bag
	MV not in order	See fault "MV not in order"
	Hose connections in device not in order	Check hoses, replace if necessary (6.8, page 27)
	Pressure sensor on board is faulty	Change board (6.7, page 26)
	Adjuster knob for ventilation defective	Replace adjuster knob (6.3, page 21 and 6.4, page 22)
	Pressure measurement connection blocked	Replace (6.8, page 27)
Alarms (visual + acoustic) not in order	LED's do not light up	Change board (6.7, page 26)
	Incorrect indication (Stenosis/ Disconnection)	Check settings, check hose connection to patient valve (Chapter 6.7 of operating instructions)
No (visual + acoustic) alarm	Board defective	Change board (6.7, page 26)
No acoustic alarm	Alarm confirmation pressed?	Wait for between 30 – 120 s
	Speaker defective	Replace speaker (6.6, page 25)
Alarm < 2.7 bar although pressure present	Pressure sensor defective	Change board (6.7, page 26)
	Hose connections in device not in order	Check hoses, replace if necessary (6.8, page 27)
alarm.	Battery failing	Change main battery **18** (4.2, page 16), check button cell **17** (3.8.1, page 10) and replace if necessary (4.2, page 16)
Pressure inlet leaking	Angled connector in device is loose or defective	Check (6.8, page 27)
Hose system in device is leaking		Check hoses, replace if necessary (6.8, page 27)
Pressure sensor on board is leaking		Change board (6.7, page 26)
Mask/tube switch **1** defective		Change fascia film (6.12, page 32)
Pneumatic block leaking		Replace pneumatic block (6.8, page 27)
Frequencies not in order	Potentiometer wrongly adjusted	Adjust potentiometer (6.10, page 30)
	Potentiometer defective	Replace pneumatic block (6.8, page 27)
Test bag is not filled sufficiently during functional check, Disconnection alarm	Ventilation parameters incorrectly set	Correct ventilation parameters
	Patient valve not working properly	Check lip membrane
	Pressure measurement tube not fitted	Fit pressure measurement tube

Fault	Cause	Remedy
No Stenosis alarm when patient valve closed during functional check (see "Checking the breath volume" in the operating instructions)	Patient valve not working properly	Check lip membrane

6. Repair information and instructions

6.1 General

Always perform repairs to MEDUMAT Easy at an ESD-protected workplace.

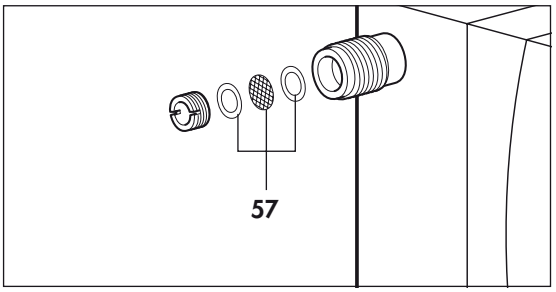
- **Observe the safety information in the Operating Instructions for MEDUMAT Easy.**
- All operations on this device require detailed knowledge and observation of the Operating Instructions and the Service and Repair Instructions.
- Do not carry out any repairs that are not described in these Service and Repair Instructions. This is the only way to guarantee trouble-free functioning of MEDUMAT Easy.
- Make sure that your hands and workplace are clean during the repair work.
- Be sure to carry out a final check after every repair (see "3. Final check" on page 8).
- If you replace components or individual parts, use only genuine WEINMANN parts.
- When ordering the lower part of the housing **24**, please specify device type, year of manufacture and device number.
- **Note:**
  The item numbers quoted in the following text are identical to the item numbers in the spare parts list on Page 35 and the overview on Page 4.

6.2 Changing the filter in the pressurised gas connection

Tools and equipment required

- Flat-head screwdriver
- Tweezers.

1. Unscrew the slot-head screw from the pressurised gas connection **10**.
2. Use tweezers to remove filter set ***57***.
3. Carefully insert a new filter set ***57*** in the pressurised gas connection.
4. Screw the slot-head screw firmly into the pressurised gas connection.

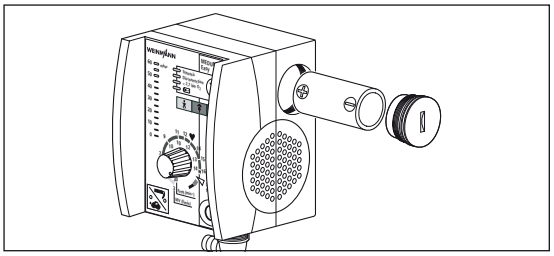


6.3 Opening the device

Tools and equipment required

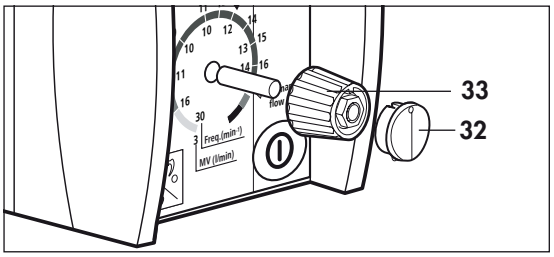
- ESD-protected workplace,
- Phillips screwdriver, size 1,
- Tubular hexagon box spanner 10 mm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the battery compartment with a coin and remove the battery.

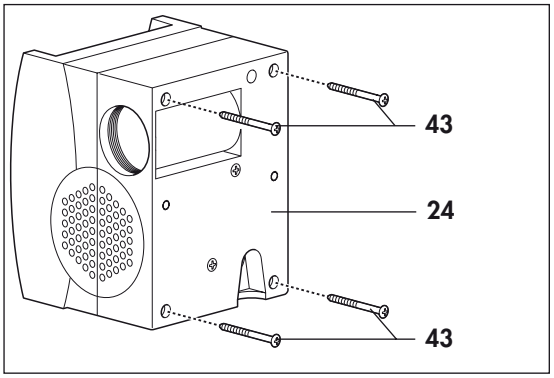


2. Lift off the lid **32**.
3. Hold the adjuster knob **33** still with the special tool and loosen the nut with a tubular hexagon socket spanner (10 mm).

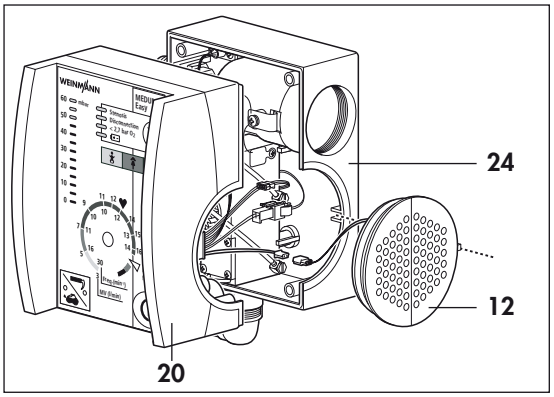
   Do not unscrew the nut completely – only loosen it. Otherwise the knob will split into its separate parts.
4. Pull off the adjuster knob **33**.



5. Place the device on a non-slip surface and unscrew the 4 screws **43** from the rear of the device.



6. Place the device on its side and carefully pull the two parts of the housing apart until the locating pin of the adjuster knob is pulled completely out of the upper part of the housing **20**.
7. Remove the speaker **12** from the lower part of the housing **24** and disconnect it.



8. Disconnect the plug of wiring harness **51** from the board.

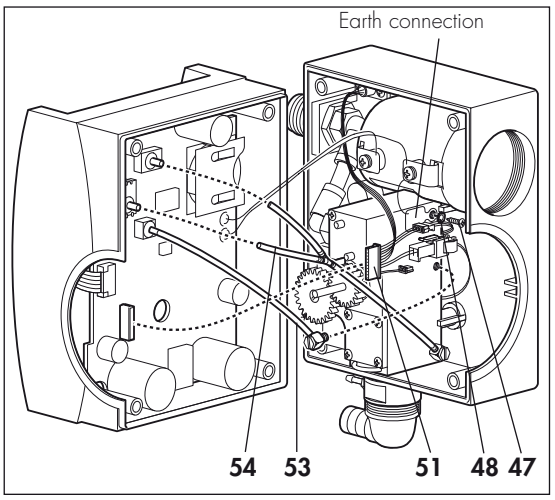
   Note:
   This is best done with flat-nose pliers. Be very careful not to damage the board with the pliers.

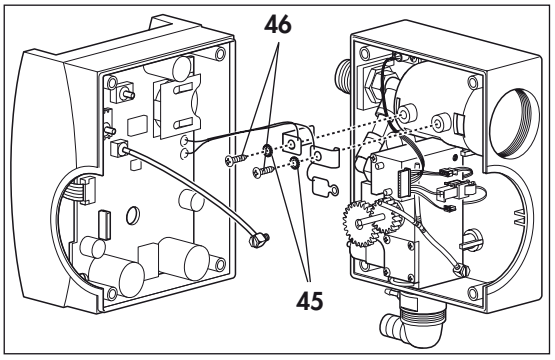
9. Unscrew the blue sensor tube **53** from the pneumatic block.

   Note:
   Do NOT pull sensor tube 53 off the pressure sensor on the board, as this will damage the sensor.

10. Pull the ends of the Y-shaped sensor tube **54** off the sensors on the board.
11. Flap the two parts of the housing apart and place them with the outside downwards.
12. Unscrew screw **47** with the serrated washer **48** from the earth connection to the pneumatic block.
13. Unscrew the two screws **46** with the spring washers **45** and remove the battery contacts from the battery compartment.

    The two halves of the housing are now separated.



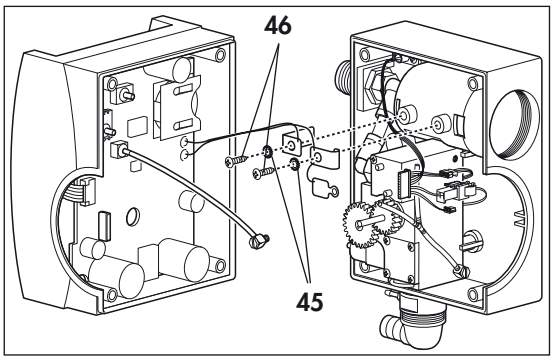


6.4 Closing the device

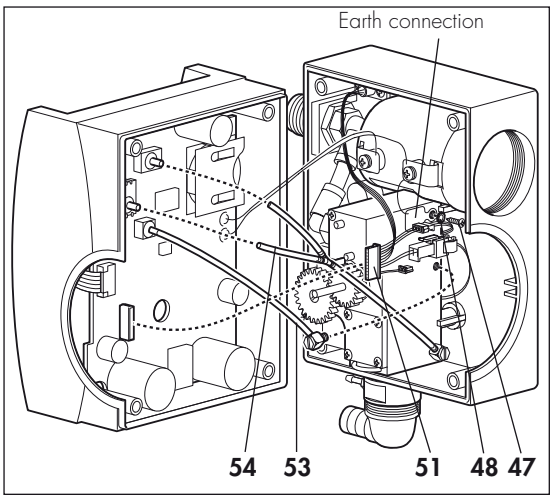
Tools and equipment required

- ESD-protected workplace,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Tubular hexagon box spanner 10 mm,
- Special tool WM 22829 from special tool set WM 15349,
- Allen key SW 2.5.

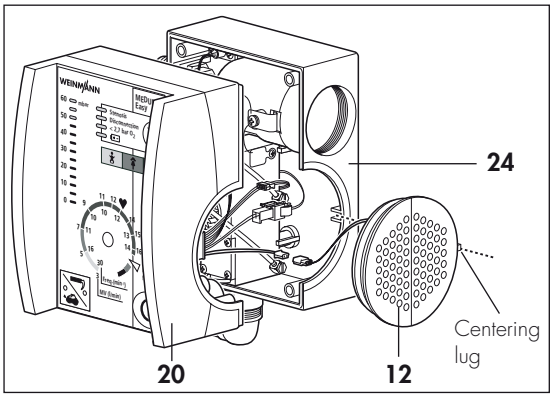
1. Place the two parts of the housing side by side with the outside facing downwards.
2. Place the battery contacts in the battery compartment and screw them in place with the two screws **46** and the spring washers **45**.



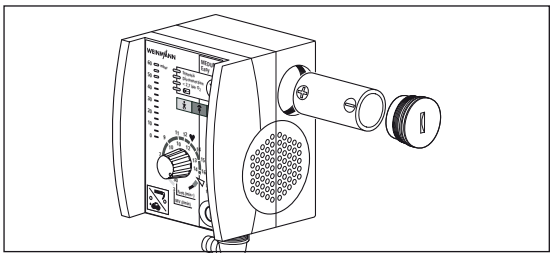
3. Push the ends of the Y-shaped sensor tube **54** onto the sensors on the board.
4. Screw the blue sensor tube **53** onto the pneumatic block.
5. Connect the plug of wiring harness **51** to the board.
6. Attach the earth connection to the pneumatic block using screw **47** and serrated washer **48**.



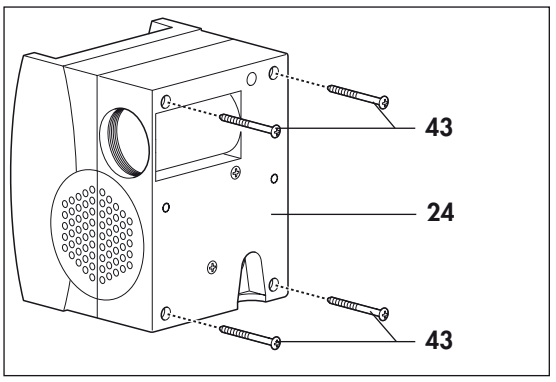
7. Connect up the speaker **12** and insert it in the recess in the lower part of the housing **24**. The centering lug of the speaker must be located in the corresponding groove in the lower part of the housing.
8. Push the adjuster knob locating pin through the hole in the board and put the two halves together.



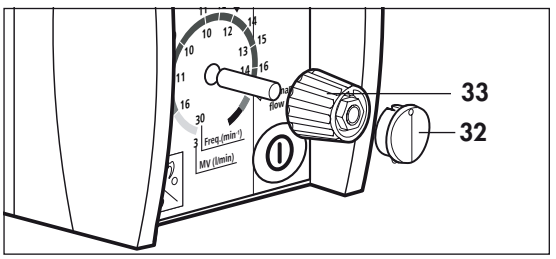
9. Insert the battery in the battery compartment and close the lid with a coin. Make sure the battery is correctly connected.



10. Now screw up the lower part of the housing with the 4 screws **43** using a torque of 50 ±5 Ncm.



11. Secure the adjuster knob **33**:
    - Push the adjuster knob onto the spindle as far as it will go, then pull it out a fraction.
    - Hold the knob firm with the special tool and screw it tight with a torque of 200 ±10 Ncm.



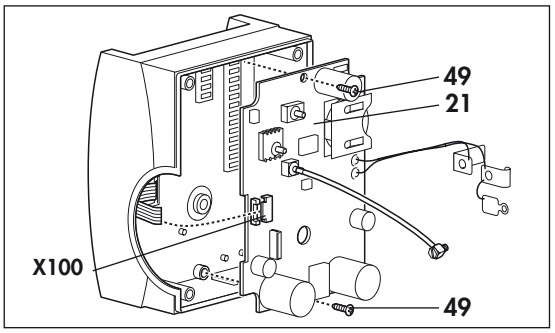
12. Check the alignment of the adjuster knob. When the knob is turned fully to the left, the white line must point to **MV: 3 l/min**. If it does not, slacken the nut and realign the adjuster knob.
13. Place the cap **32** on the adjuster knob **33**.
14. Perform the final check (see "3. Final check" on page 8).

6.5 Replacing button cell

Tools and equipment required

- ESD-protected workplace,
- Phillips screwdriver, size 1,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

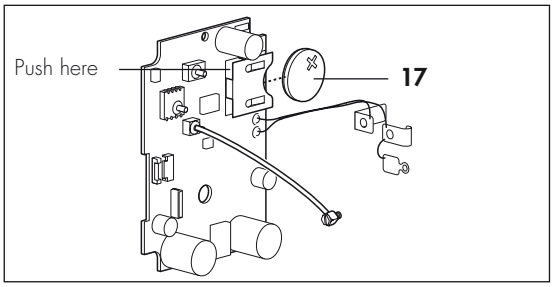
1. Open the device (see "6.3 Opening the device" on page 21).
2. Release the ribbon cable from its clamp **X100**: To do so, lift up the top part of the clamp. Then you can pull out the cable.
3. Unscrew the two screws **49** and remove the board **21** from the upper part of the housing.



4. To remove the button cell **17**, use a match or similar to ease it slightly out of the holder and pull the button cell out sideways with the other hand.

   Caution!
   Do not use sharp or pointed objects for this purpose, as this could damage the board.
5. Insert a new button cell **17**.

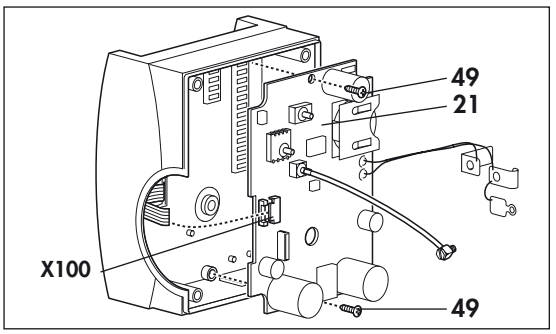
   Make sure it is installed the right way round.



6. Insert the board **21** in the upper part of the housing.

   Make sure that the ribbon cable is not under the board or jammed between it and the housing.

7. Attach the board **21** with the two screws **49**.
8. Place the ribbon cable in the clamp **X100** on the board and then press down the top part of the clamp.
9. Close the device (see "6.4 Closing the device" on page 22). Use a new main battery **18**.
10. Perform a final check (see "3. Final check" on page 8).



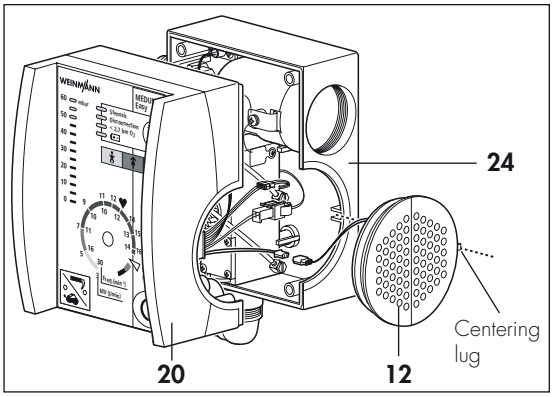
Please remember that old batteries must not be disposed of in household waste. Always take old batteries to a local collection point.

6.6 Changing the speaker

Tools and equipment required

- ESD-protected workplace,
- Phillips screwdriver, size 1,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349.

1. Open the device (see „6.3 Opening the device" on page 21, steps **1.** to **6.**).
2. Remove the speaker **12** from the lower part of the housing **24** and disconnect the speaker cable plugs. Put the old speaker on one side.
3. Take the new speaker **12** and connect the speaker cable plugs.
4. Insert the speaker **12** in the recess in the lower part of the housing **24**. The centering lug of the speaker must be located in the corresponding groove in the lower part of the housing.
5. Close the device (see „6.4 Closing the device" on page 22, steps **8.** to **13.**).
6. Perform the final check (see "3. Final check" on page 8).



6.7 Changing the board

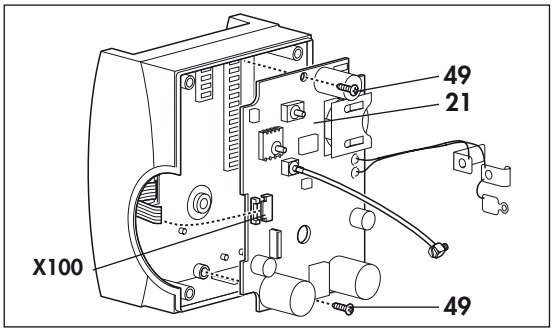
Tools and equipment required:

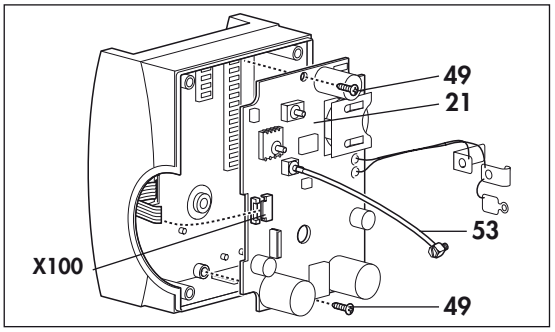
- ESD-protected workplace,
- Phillips screwdriver, size 1,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the device (see "6.3 Opening the device" on page 21).
2. Release the ribbon cable from its clamp **X100**: To do so, lift up the top part of the clamp. Then you can pull out the cable.
3. Unscrew the two screws **49** and remove the board **21** from the upper part of the housing.
4. Place the new board **21** on the spacers.

   Make sure that the ribbon cable is not under the board or jammed between it and the housing.

5. Attach the board **21** with the two screws **49**.
6. Place the ribbon cable in the clamp **X100** on the board and then press down the top part of the clamp.
7. The screw of the blue sensor tube **53** is secured with a nut for transport. Remove the nut before screwing the tube to the pneumatic block
8. Close the device (see "6.4 Closing the device" on page 22).
9. Perform a final check (see "3. Final check" on page 8).



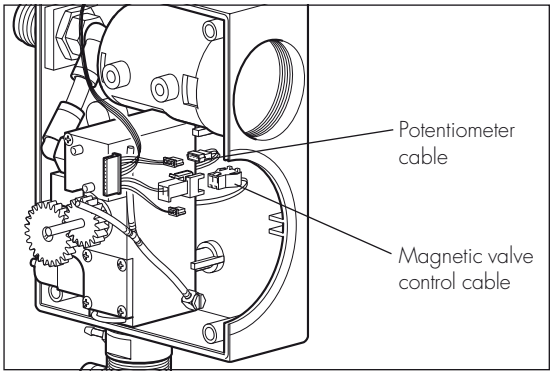


6.8 Replacing the pneumatic block

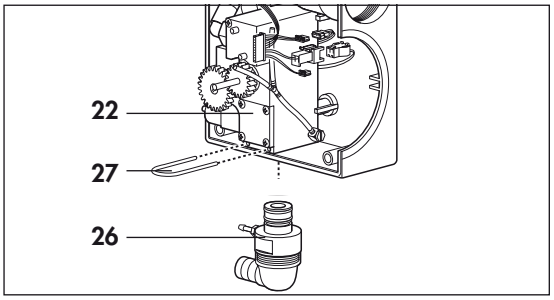
Tools and equipment required:

- ESD-protected workplace,
- Phillips screwdriver, size 2,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the device (see "6.3 Opening the device" on page 21).
2. Press the catch and unplug the magnetic valve control cable.
3. Unplug the potentiometer cable.

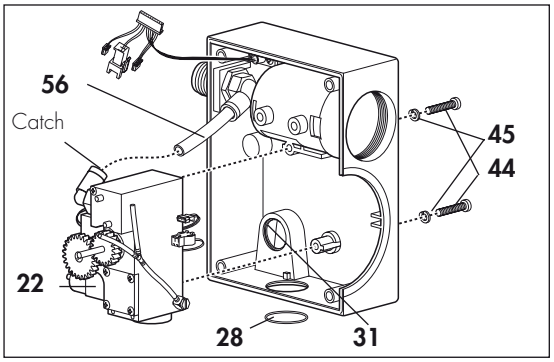


4. Remove the clip **27** from the pneumatic block **22**.
5. Pull the elbow connector **26** off the pneumatic block **22**.

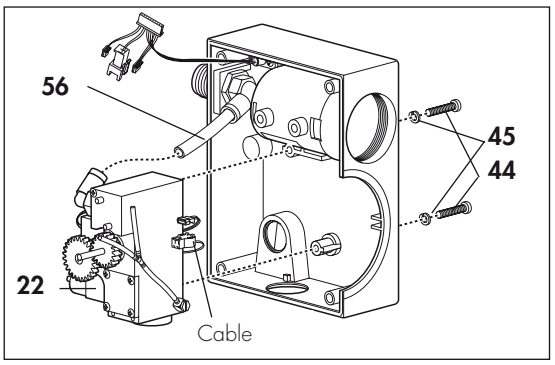


6. Turn the lower part of the housing over, hold it and the pneumatic block tight and unscrew both screws **44** together with the spring washers **45**.
7. Turn the lower part of the housing over again.
8. Press the catch towards the elbow connector and pull the pneumatic block **22** off the tube **56**.

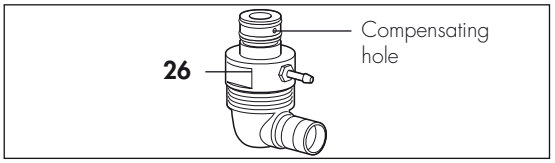
   When you remove the pneumatic block from the lower part of the housing, the O-ring **28** will fall out of the connection. Make sure that the O-ring **31** does not fall out of the relief outlet valve.



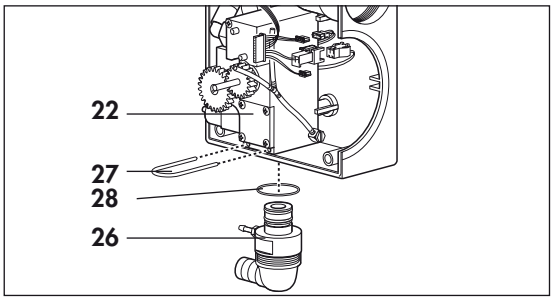
9. When inserting the new or replacement pneumatic block **22**, insert the tube **56** in the elbow connector. Make sure that the cables are routed below the pneumatic block to the right-hand side.
10. Turn the lower part of the housing over, hold it and the pneumatic block tight and screw up both screws **44** with their spring washers **45**.



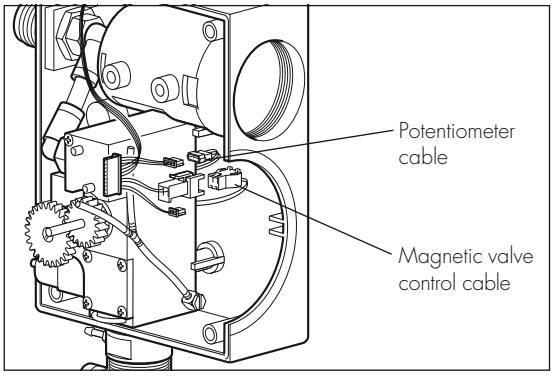
11. Lubricate the O-rings of the elbow connector **26** with a little O_2 lubricant (WM 14298). Make sure that the compensating hole remains free.



12. Insert the O-ring **28** in the groove in the outlet from the pneumatic block.
13. Insert the elbow connector **26** in the pneumatic block **22**.
14. Insert the clip **27** in the pneumatic block **22**.



15. Plug in the potentiometer cable.
16. Plug in the magnetic valve control cable.
17. Close the device (see "6.4 Closing the device" on page 22).
18. Perform a final check (see "3. Final check" on page 8).



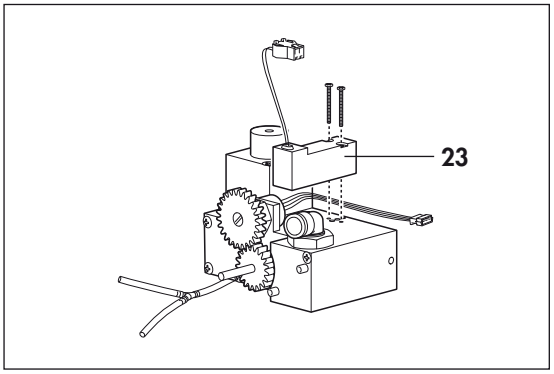
6.9 Replacing the 3/2-way magnetic valve

Tools and equipment required:

- ESD-protected workplace,
- Phillips screwdriver, size 2,
- Phillips screwdriver, size 0,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the device (see "6.3 Opening the device" on page 21).
2. Remove the pneumatic block (see "6.8 Replacing the pneumatic block" on page 27).
3. Place the pneumatic block on the side with the type plate.
4. Unscrew the two securing screws and remove the 3/2-way magnetic valve **23**.
5. Insert the new 3/2-way magnetic valve **23** in the correct position.

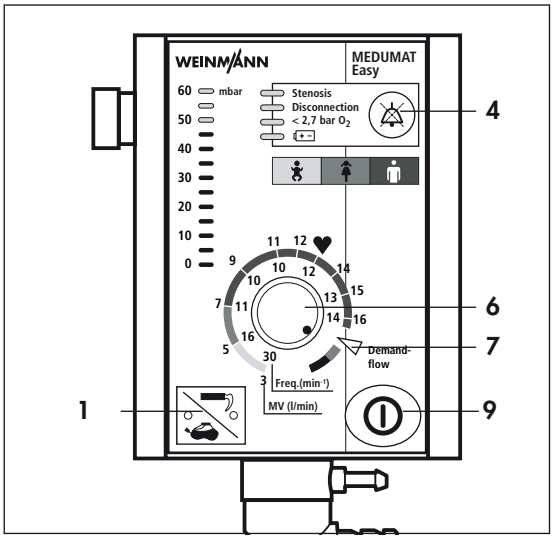
   Make sure that the seal for the 3/2-way magnetic valve is seated in the correct position.
6. Fasten the 3/2-way magnetic valve with the screws supplied with it.
7. Reinstall the pneumatic block (see "6.8 Replacing the pneumatic block" on page 27).
8. Close the device (see "6.4 Closing the device" on page 22).
9. Perform a final check (see "3. Final check" on page 8).



6.10 Calibrating the potentiometer (after changing pneumatic block including potentiometer)

When the pneumatic block including potentiometer is changed, the potentiometer must be recalibrated for the board.

1. Make sure the device is switched off.
2. Press the On/Off switch **9** and immediately hold down the alarm confirmation button **4** and the mask/tube ventilation switch **1**. Then release the button. After a brief interval, the 30 mbar LED on the bar graph indicator lights up.
3. To set the first calibration value, turn the adjuster knob **6** fully to the left to the value **MV 3, Freq. 30**.
4. Press the mask/tube switch **1**. The device now makes a plausibility check.
   - If the value is not correct, all alarm LEDs light up until the correct value is present at the adjuster knob **6** and has been confirmed with the mask/tube ventilation switch **1**. Or you can cancel the potentiometer calibration process by pressing the On/Off switch **9**.
   - If the value is correct, this is indicated by the 0 mbar LED on the bar graph lighting up. You can now set the next value.
5. Turn the adjuster knob **6** fully to the right to the white Demandflow zone.
6. Press the mask/tube switch **1**. The device accepts this value The LED on the bar graph lights up, and you can move on to setting the next value.
7. Turn the adjuster knob **6** back beyond the index point **7** to the ventilation mode zone, then to the right again until it reaches the index point (zone **MV 16, Freq. 14**).
8. Press the mask/tube switch **1** again. The calibration values are stored and the device exits the calibration mode.



Note:

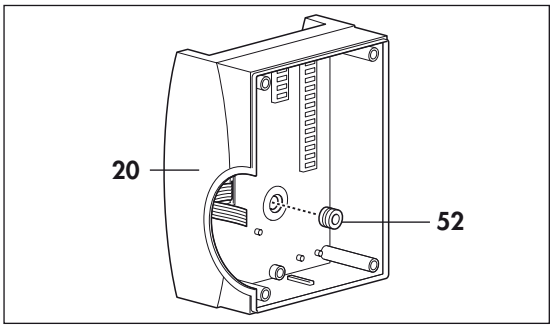
Until the last step the calibration mode can be cancelled at any time by pressing the On/Off switch **9**, without storing the new values. If an invalid value is detected during calibration (all alarm LEDs light up), no value is stored either.

6.11 Changing upper part of housing

Tools and equipment required:

- ESD-protected workplace,
- Phillips screwdriver, size 2,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the device (see "6.3 Opening the device" on page 21).
2. Remove the board (see „6.7 Changing the board" on page 26, steps **2.** and **3.**).
3. Remove the grommet **52** from the upper part of the housing **20**.



You have now removed all the parts. You can start reassembling.

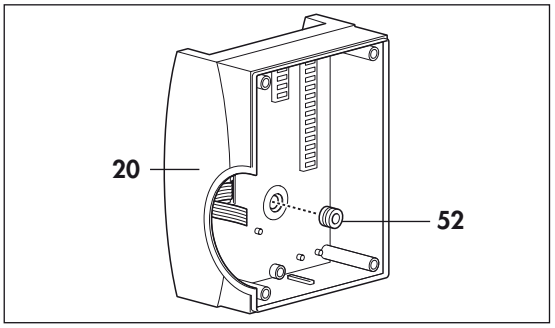
4. Insert the grommet **52** in the new upper part of the housing **20**.
5. Refit the board (see „6.7 Changing the board" on page 26, steps **4.** to **6.**).
6. Close the device (see "6.4 Closing the device" on page 22).
7. Perform a final check (see "3. Final check" on page 8).

6.12 Changing the fascia film

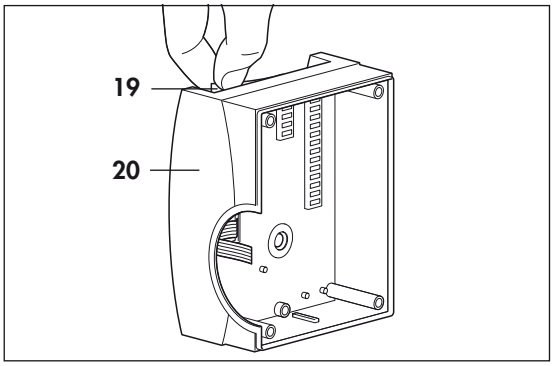
Tools and equipment required:

- ESD-protected workplace,
- Phillips screwdriver, size 2,
- Tubular hexagon box spanner 8 mm,
- Tubular hexagon box spanner 10 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special tool WM 22829 from special tool set WM 15349,
- Flat-nose pliers.

1. Open the device (see "6.3 Opening the device" on page 21).
2. Remove the board (see „6.7 Changing the board" on page 26, steps **2.** and **3.**).
3. Remove the grommet **52** from the upper part of the housing **20**.

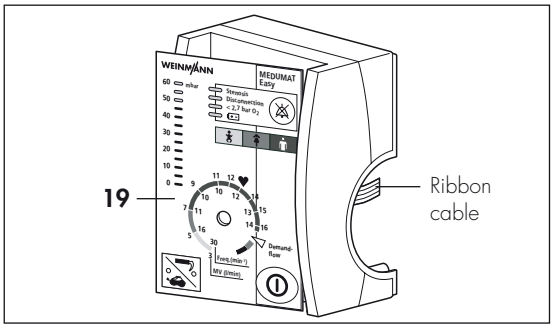


4. From inside the housing, insert the tubular box spanner through the hole for the grommet **52** and press the fascia film **19** outwards until you can grasp it on one side. Then completely remove the fascia film from the upper part of the housing.
5. Use 70% isopropanol to remove all traces of adhesive from the upper part of the housing. Then wait until the isopropanol has completely evaporated from the housing surface.

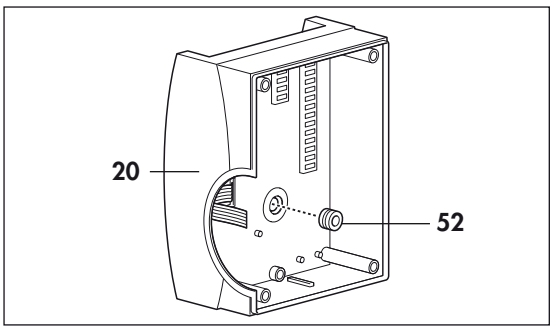


You have now removed all the parts. You can start reassembling.

6. Stick the new fascia film **19** to the upper part of the housing:
   - First position the fascia film on the upper part of the housing on the side where the ribbon cable is attached.
   - Run the ribbon cable through the slit in the upper part of the housing.
   - Then affix the entire fascia film, taking care to avoid bubbles.



7. Refit the grommet **52** in the upper part of the housing **20**.
8. Refit the board (see „6.7 Changing the board" on page 26, steps **4.** to **6.**).
9. Close the device (see "6.4 Closing the device" on page 22).
10. Perform a final check (see "3. Final check" on page 8).

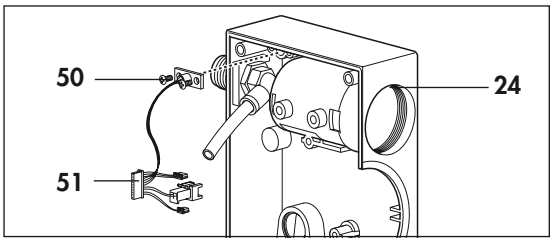


6.13 Changing lower part of housing

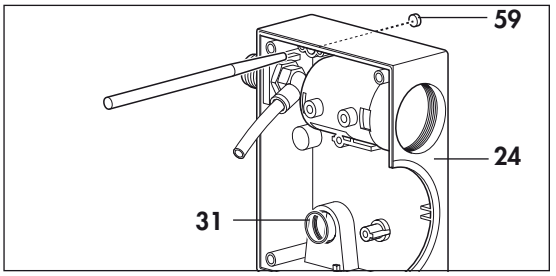
Tools and equipment required:

- ESD-protected workplace,
- Phillips screwdriver, size 2,
- Open-ended spanner, 13 mm,
- Open-ended spanner, 22 mm,
- Torque spanner 50 ±5 Ncm,
- Torque spanner 200 ±10 Ncm,
- Special counter tool G 3/8 (WM 22827) and special spanner 17 mm (WM 22828) from special tool set WM 15349,
- Vice with jaw protectors,
- Flat-nose pliers.

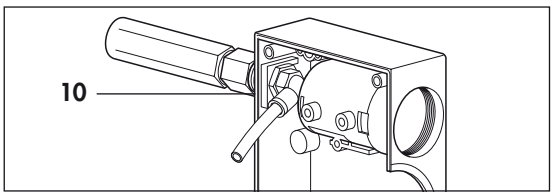
1. Open the device (see "6.3 Opening the device" on page 21).
2. Remove the pneumatic block (see „6.8 Replacing the pneumatic block" on page 27, steps **2.** to **8.**).
3. Undo the screws **50** and remove the wiring harness **51**.



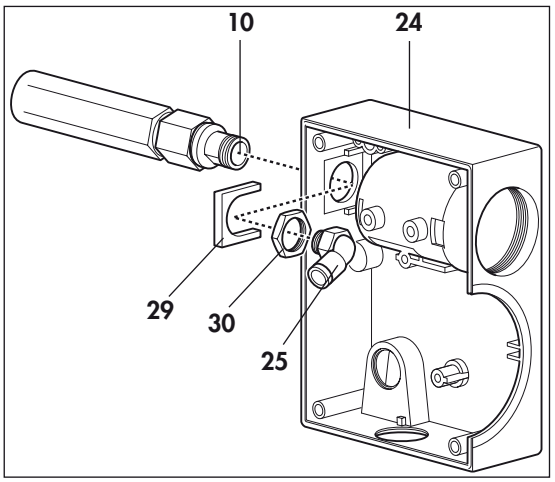
4. Use a pointed object to push the blanking plug **59** of the interface connection out of the lower part of the housing **24** from inside.
5. Remove the O-ring **31** from the lower part of the housing **24**.



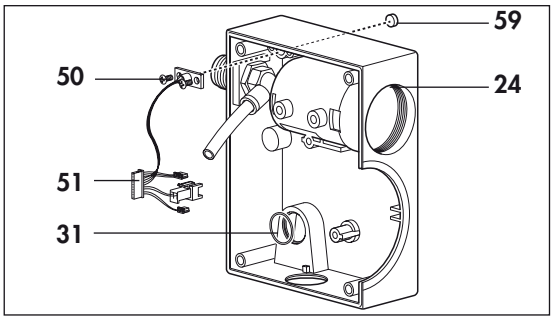
6. Screw the special counter tool onto the pressurised gas connection **10**.
7. Clamp the special counter tool in a vice.



8. Use a 22-mm open-ended spanner to screw the nut of the special counter tool firmly again the pressurised gas connection.
9. Screw the elbow connector **25** off with a 13-mm open-ended spanner.
10. Use the 17-mm special spanner to slacken the nut **30** and unscrew it completely.
11. Lift out the plate **29**.
12. Remove the lower part of the housing **24**.
13. Take the new lower part **24** and place it on the pressurised gas connection **10**.
14. Slide the plate **29** on the inside of the housing onto the connection.
15. Tighten the 17-mm nut **30** on the inside of the connection.
16. Fasten the elbow connector **25** to the connection.
17. Use the 22-mm open-ended spanner to undo the nut of the special counter tool.
18. Open the vice.
19. Screw the special counter tool off the pressurised gas connection **10**.



20. Using screws **50**, screw the interface cable of the wiring harness **51** into the new lower part of the housing **24**.
21. Push the blanking plug **59** into the interface connection from outside.
22. Refit the O-ring **31** in the lower part of the housing **24**.
23. Reinstall the pneumatic block (see „6.8 Replacing the pneumatic block“ on page 27, steps **9.** to **16.**).
24. Close the device (see “6.4 Closing the device” on page 22).
25. Perform the final check (see “3. Final check” on page 8).



7. Spare parts

7.1 Spare parts list

Note:

The item numbers in the following table are identical to the numbers in the text of these Service and Repair Instructions and in the Operating Instructions.

Item No.	Description	Order No.
10	Pressurised gas connection (threaded), preassembled	WM 22685
12	Speaker – Seal	WM 28077 WM 28066
16	Ventilation hose	WM 22647
17 **18**	– Button cell CR 2430 – Battery 3.6 volt	WM 22652 WM 28045
19	Fascia film	WM 28009
20	Upper part of housing with film up to device no. 2279* comprising: – Upper part of housing with film – Label for languages – Label for patient connection Upper part of housing with film from device no. 2280* comprising: – Upper part of housing with film – Rating plate – Label for patient connection	WM 28078 WM 28078
21	PCB, MEDUMAT Easy, exchange	WM 28079
22	Pneumatic block, complete, new	WM 28025
23	3/2-way magnetic valve	WM 28035
24	Lower part of housing up to device no. 2279* comprising: – Lower part of housing – Rating plate – Label for O_2 input – Label for excess pressure valve – Label for battery position Lower part of housing from device no. 2280* comprising: – Lower part of housing – Label for O_2 input – Label for languages – Label for excess pressure valve – Label for battery position	WM 28137 WM 28137
25	Elbow connector 4/6	WM 22552
26	Elbow connector ventilation hose, complete – Hose connection for patient valve	WM 28057 WM 3213

27	Clip for elbow connector	WM 28052
28	O-ring, elbow connector	WM 1145/141
29	Torque plate	WM 22509
30	Nut for pressure connection	WM 22586
31	O-ring, pressure relief valve	WM 1145/3
32	Cap	WM 22941
33	Short knob	WM 4891
	Patient valve, comprising:	WM 3280
34	– bottom part of control unit for spontaneous breathing	WM 3281
35	– Membrane for Spontaneous breathing tube	WM 3284
36	– insert for spontaneous breathing tube	WM 3282
37	– top part of control unit	WM 3181
38	– tube connection for patient valve	WM 3213
39	– Lip membrane	WM 3211
40	– Disc membrane Exhalation tube	WM 3212
41	– O-ring 15-1,5	WM 1145/118
42	O-ring for battery compartment lid	WM 1145/145
43	Fillister head screw 30 x 40 mm for housing	WM 58347
44	Fillister head screw M3 x 16mm for pneumatic block	WM 53033
45	Spring washer for fastening pneumatic block and battery contacts	WM 50350
46	Fillister head screw KB 35 x 8 for battery contacts	WM 58350
47	Cheese-head screw M3 x 6 for earth connection	WM 50594
48	Serrated washer for earth connection	WM 51850
49	Fillister head screw KB 30 x 6 for board	WM 23159
50	Fillister head screw KB 25 x 6 for interface cable, lower part of housing	WM 58320
51	Cable harness	WM 28088
52	Grommet	WM 4112
53	Sensor tube, length 65 mm	WM 22966
	Set, tubes MEDUMAT,	WM 15058
	comprising:	
54	– 3x tube, silicone, length 52 mm	WM 28097
55	– Y-connector	WM 28053
56	– Oxygen inlet tube, length 40 mm	WM 28095
57	Set, filter, comprising: – Filter – Sealing washer 3.5 x 6 x 0.5	WM 15284
58	Service label – for servicing in 2 years' time – for servicing in 4 years' time – for servicing in 6 years' time	 WM 75340 WM 75341 WM 75339
59	Blanking plug for interface connection, lower part of housing	WM 1504
	Operating instructions GB, ES, PT	WM 16862

* When placing an order, please make sure to include type, unit serial no. and year built.

7.2 Service sets

Overview

Years	2	4	6	8	10	12	14	16
Service set	WM 15463	WM 15462	WM 15463	WM 15464	WM 15463	WM 15465	WM 15463	WM 15464

Service set 2, 6, 10 and 14 years

Set, WM 15463
comprising:

- Battery
- Lip membrane
- Membrane for test connector
- Membrane for spontaneous breathing tube
- Membrane for exhalation tube
- Sealing washer 3.5 x 6 x 0.5
- Filter
- O–ring 15 x 1.5

Service set 4 years

Set, WM 15462
comprising:

- Set WM 15463
- Button cell

Service 8 and 16 years

Set, WM 15464

comprising:

- Set WM 15463
- Button cell
- Seal for speaker
- Set, tubes
- Pneumatic block
- 2x O–ring 11 x 1.5 for elbow outlet

Service 12 years

Set, WM 15465

comprising:

- Set WM 15463
- Printed circuit board (PCB) MEDUMAT Easy
- O-ring 26 x 2 for battery compartment lid

8. Tools and Test Equipment

This section lists all the tools and test equipment mentioned in these Service and Repair Instructions.

The specific tools and test equipment required in each case are listed in the individual chapter.

You can obtain special tools from WEINMANN.

8.1 General tools

- Flat-head screwdriver, size 0.5 x 3 x 100;
- Phillips screwdriver, size 0;
- Phillips screwdriver, size 1;
- Phillips screwdriver, size 2;
- Open-ended spanner, 13 mm, for elbow connector at O_2 inlet;
- Open-ended spanner, 22 mm, for special counter tool;
- Vice with jaw protectors, countering threaded connection;
- Tubular hexagon box spanner 10 mm, for adjuster knob;
- Tubular hexagon box spanner 8 mm, for fascia film;
- Tweezers, for filter set;
- Diagonal cutter;
- Flat-nose pliers;
- Allen key, 2.5 mm.
- Torque spanner 50 ±5 Ncm;
- Torque spanner 200 ±10 Ncm.

8.2 Special tools

The following tools can be obtained from WEINMANN:

- Special tool set, comprising: WM 15349
  - Special counter tool G 3/8, for countering threaded connection at O_2 inlet WM 22827
  - Special spanner, 17 mm, for counter nut at O_2 inlet; WM 22828
  - Special tool, for holding securing adjuster knob. WM 22829
  - Set, hose with syringe WM 15359
  - Special pliers WM 22928

8.3 Testing equipment

- Oxygen concentration meter, type Oxycontrol WM 13550
- Volume flow meter

  Type RT 200 (Timeter)

  obtainable from:
  Allied Healthcare Products Inc.
  1720 Sublette Avenue
  St. Louis, Missouri, MO 63110
  USA

  Tel.: 001-800-444-3954
  Fax: 001-314-771-5183

  or

  Type EKU VIP ventilator tester

  obtainable from:
  EKU Elektronik GmbH
  Feldstrasse 9a
  D-56291 Leiningen
  Germany

  Tel.: 00 49 6746-1018
  Fax: 00 49 6746-8484
  www.eku-elektronik.de

- www.eku-elektronik.deTest set for final check WM 15323
- Set, supply test
  Medumat/Modules WM 15440
- Set, test set respiration and pressure reducer
  flow WM 15443
- Pressure gauge 0 to 6.3 bar, class 1.6;
- Pressure gauge 0 – 100 mbar, class 1.6

  Type WIKA

  obtainable from:
  Alexander Wiegand GmbH & Co.
  Alexander-Wiegand-Strasse 30
  D-63911 Klingenberg am Main
  Germany

  Tel.: 00 49 9372/1320

- Digital multimeter
- Hazet torque wrench
  obtainable from:

  Hommel
  Heidelberger Str. 52
  D-68519 Viernheim
  Germany

  Tel.: 00 49 6204/738-0
  Fax: 00 49 6204/739-222

  or

  Type Flow Analyser PF-300

  obtainable from:
  SI-special instruments GmbH
  Strelgasse 2
  D-86720 Nördlingen
  Germany

  Tel.: 00 49 90 81/2 20 61 or 2 20 62
  Fax: 00 49 90 81/2 20 63
  www.specialinstruments.com

9. Technical data

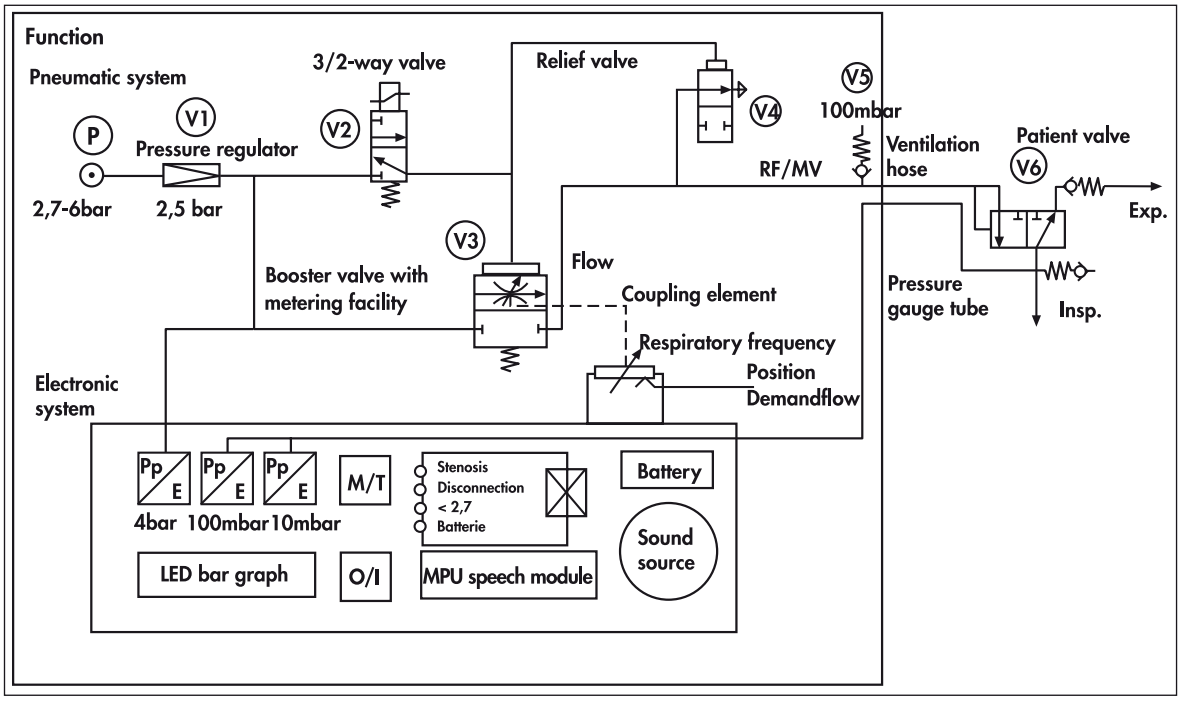
	MEDUMAT Easy
Product category according to 93/42/EEC	II b
Dimensions L x W x H	100 x 145 x 90 incl. connections
Weight incl. accessories	approx. 0.6 kg
Operation: – Temperature range – Humidity – Air pressure	 -18°C to +60°C max. 95 % 70 kPa to 110 kPa
Storage	-40°C to +70°C
Electromagnetic compatibility acc. to EN60601-1-2 and EN 794-3: – Radio interference suppression – Radio interference resistance	(the test parameters and threshold values are obtainable from the manufacturer on request) EN 55011 EN 61000-4-2 to 3
Control	Timing pulse, volume constant
Gas input	Medicinal oxygen
Operating pressure	2.7 to 6.0 bar
Minimum gas volume required	70 l/min O_2
Insp-exp. ratio	1:1.67
Ventilation frequency	Continuously variable from 10 to 30 min^{-1}
Minute volume (MV) MV tolerances: – Room temp. (20 °C) – -18°C to +60°C	continuously adjustable from 3 to 16 l/min for 3 l/min =±20% for >3 l/min = ±15% for 3 l/min =±35% for >3 l/min = ±20%
Max. ventilation pressure	20 or 45 mbar
O_2 concentration	100% O_2
Pressurized gas connection	External thread G 3/8
Ventilation hose connection	External diameter 13 mm
Patient valve – Inspiration tube	15 mm socket 22 mm plug ISO 5356-1

	MEDUMAT Easy
Patient valve – Expiration tube	30 mm socket ISO 5356-1
Power supply Life expectancy Max. storage period	Maintenance-free lithium battery 3.6 V; 5.2 Ah, > 2 years 10 years after delivery
Auxiliary power for alarm system Max. storage period	Button cell CR 2430 10 years after delivery
Fuse F1	T 500 L 250 V
Ventilation hose	Spiral silicone NW 10
Degree of protection against water	IP X4
Standards complied with	EN 794-3; EN 60601-1 EN 1789
Alarm sound pressure	60 dB (A)
Accuracy of ventilation pressure measurement	±5% of upper range value
Resistance, patient valve (under EN 794-3): – Inspiration – Expiration – Spontaneous breathing	 <6 mbar at 60 l/min <6 mbar at 60 l/min <1.5 mbar at 30 l/min
Elasticity of breathing system	Negligible
Patient valve dead space	12.8 ml
Components with critical flow direction	Patient valve
Components containing latex	None

Subject to technical change without notice.

CE 0197

9.1 Pneumatic / electronic systems



The input pressure at p is max. 6bar. This is dynamically reduced by V1 to 2.5 bar. This is the input pressure at V2, V3 and V4.

Inspiration

An electrical impulse to V2 opens V3 and closes V4. Oxygen flows through the ventilation hose to the patient valve. If the ventilation pressure in the patient valve reaches >100 mbar, the relief valve V5 will open.

Expiration

A fresh electrical impulse closes V2. The relief valve V4 opens and vents the ventilation hose. The patient breathes out through the patient valve.

Demandflow

An inspiration impulse (trigger) at V2 opens valves V3 and V4.

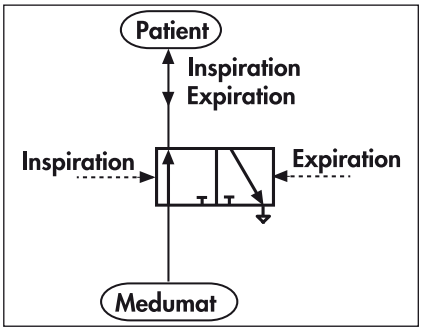
Electronic system

The microprocessor-controlled electronic system sets the ventilation parameters and monitors ventilation, and also O_2 supply and power supply. If necessary, a visual and acoustic alarm is given. The ventilator has an audio response facility that can be switched on for user guidance.

Patient valve

During inspiration the respiratory gas flows to the patient.

During expiration the expiration pressure switches the valve so that the patient can breathe out.



10. Technical Changes

Technical Changes	From Device No.	Date
New position of device information plates	2280	27.04.07

11. Repair and service records

Device master data	Service and repair work carried out in accordance with service instructions	
Manufacturer: WEINMANN GmbH + Co. 22525 Hamburg Device type: **MEDUMAT Easy** Order No.: _____ Date of manufacture: _____ **Safety check - 2 years** _____ **Safety check - 4 years** _____ **Safety check - 6 years** _____ **Safety check - 8 years** _____ **Safety check - 10 years** _____	**Measures / Comments**	Service performed in accordance with MEDUMAT service instructions Company _____ Date _____ Signature Company _____ Date _____ Signature Company _____ Date _____ Signature Company _____ Date _____ Signature

Test record: Safety check in accordance with Test Instructions WM 28001

Device: MEDUMAT Easy **WM No.**: 28000 **Device No.**: ..... **Date of manufacture**: .....

1. Testing equipment
- Pressure gauge 0 – 6.3 bar, class 1.6 (test pressure 6 ± 0.15 bar, operating pressure 4.5 ± 0.15 bar)
- O_2 concentration meter
- Volume flow meter (e.g. RT 200, ViP, PF-300); adjustable orifice 10 mbar; test set WM 15323
- Digital multimeter

2. Preparations for test
- Connect MEDUMAT to test equipment.
- Set language "English"
- Set MEDUMAT to f = 10 min^{-1}, MV = 11 l/min and "tube" (p_{max} = 45 mbar).

	Measurement	OK	not OK
3. Enter device data • Entry of above device data			
4. Leak test at 6 bar • Pressure drop inlet side ≤ 0.2 bar/min • Pressure drop pressure measurement zone < 2.0 mbar/min		☐ ☐	☐ ☐
5. Self-test when device is switched on • 4 red and 1 green LED (i.e. one each for "Tube" and "Mask") light up alternately, alarm tone and audio response sound		☐	☐
6. Functional check, control elements • Key check		☐	☐
7. Functional check, display elements • Check on alarm LEDs • Check on Demand mode LED • Check on Ventilation pressure indicator LEDs • Check on audio response		☐ ☐ ☐ ☐	☐ ☐ ☐ ☐
8. Check batteries • 3.1 V ± 0.1 V • 3.5 V + 0.2 / -0.1 V		☐ ☐	☐ ☐
9. Check pressure sensors • Input pressure sensor • Ventilation pressure sensor • Demandflow sensor		☐ ☐ ☐	☐ ☐ ☐
10.Check frequency setting • Frequency 14 ± 2 min^{-1} • Frequency 10 ± 2 min^{-1} • Frequency 30 ± 2 min^{-1}	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
11.Check breath volume at 4.5 bar supply pressure and 10 mbar back pressure • f = 14 min^{-1}, MV = 16 l/min: BV = 1140 ± 170 ml • f = 10 min^{-1}, MV = 11 l/min: BV = 1100 ± 170 ml • f = 30 min^{-1}, MV = 3 l/min: BV = 100 ± 20 ml	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
12.Check O_2 concentration at f = 10 min^{-1} and MV = 11 l/min • O_2 concentration > 98 vol.%		☐	☐
13.Functional check on pressure limit at f = 10 min^{-1} and MV = 11 l/min • Pressure limit "Mask" responds at 20 ± 5 mbar • Pressure limit "Tube" responds at 45 ± 5 mbar	☐ ☐	☐ ☐	☐ ☐
14.Functional check on relief valve • Test bag is fully inflated, then ventilator vents audibly		☐	☐
15.Check on equipment and accessories • Ventilation hose and patient valve undamaged and operational • Test set for functional check operational • Pressure reducer operational • O_2 cylinder within test deadline, valve operational • Carrying platform complete and operational • Medical products book • Operating instructions	Present yes no ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐	☐ ☐ ☐ ☐ ☐ ☐ ☐
16.Check on external condition • Connection thread undamaged, adjuster knob operational, index function working, swivelling elbow outlet moves easily		☐	☐

Service performed: yes ☐ no ☐ Final check performed: _____ Date _____ Tester No. _____ Signature

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WM 16998d - 12.08

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